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DATA PROCESSING DIGEST

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General Information

COMPUTING MACHINES: RENT OR BUY?

William Haynes Starbuck, Carnegie Institute of Technology
THE JOURNAL OF INDUSTRIAL ENGINEERING, July-August 1958; pages 254-258.

The rent-or-buy decision is considered as it applies to computing machines, and a method for making the decision is suggested. "First, the MAPI method is used to estimate the machine's life expectancy for several obsolescence rates. Second, probability theory is applied to select the most desirable life span. And third, cost estimates are made for each period of the machine's expected life."

Rent-or-buy decisions should be made individually for each unit of the computer installation.

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"All rent-or-buy decisions are basically the same. The purchase option can be described by an initial investment, I_p, and a series of periodic costs, C_p; and similarly, the rental option can be described by an initial investment, I_r, and a series of periodic costs, C_r. The difference between the two options is that I_p is greater than I_r, while C_p is less than C_r."

In order to compare the two choices, form

$$I_p - I_r = I_d$$

$$C_r - C_p = C_d$$

The central question in the rent-or-buy decision is a choice between I_d and the series C_d. The decision requires two more pieces of information: the interest rate which is acceptable as a return on I_d, and the life of the machine.

"Estimation of the interest rate is generally conceded to be a straight forward (if difficult) problem.... The difficulty arises because most customers shy away from the risks of owning an

asset which is subject to rapid technological development. Consequently, they raise the interest rate an arbitrary amount, hoping to compensate for these risks... This procedure is not to be recommended. A much more logical solution to the problem is to estimate the risks involved.

Figuring interest rate

"Let us assume, for example, that the customer is afraid that he will have to make an additional capital outlay in three years, an outlay which the manufacturer would make if the machine were rented. He should: 1) Estimate the amount; 2) Find the present worth of this amount; 3) Estimate the probability of the need arising; 4) Multiply the present worth by the probability to obtain a methematical expectation; 5) Add the expectation to I_p.

"If in addition, the period of time is in question, a probability distribution can be set up for various possible time periods."

The next step, after the interest rate has been selected, is an estimate of the machine's life span. A life span should be selected which will minimize the equivalent uniform annual cost of the machine. "The total cost of keeping a machine for an additional period of time is the sum of: 1) The loss in salvage value over that period; 2) The interest on the salvage value at the start of the period; 3) The loss over that period due to obsolescence. This latter figure is the result of comparing the cost of operating the machine owned with the cost of operating the most modern replacement."

An "operating inferiority gradient" is calculated which shows how inefficient the computer will become at each point in the future relative to new developments. Based on this gradient plus estimates of salvage value and interest cost, the cost of keeping the machine for any given number of years is estimated. The year with the lowest cost is an estimate of the life of the system. This is refined by taking into account the probability that the operating inferiority will have various values.

The next step is to compare I_d with C_d. "The present worth of C_d can be compared directly with I_d....If the present worth of C_d is greater than I_d, the customer should buy; if the present worth of C_d is less than I_d, the customer should rent." Note that "the terms in C_d need not be constant over the machine's life. The manufacturer will raise his rental price to adjust for inflationary trends; maintenance costs will probably rise as the machine ages; a change from two shift operation to three shift operation may be planned."

"A few brief comments about the calculation of I_d and C_d: 1) The problem can be greatly simplified by considering only differential costs.... 2) The figures should include any risk ex-

asset which is subject to rapid technological development. Consequently, they raise the interest rate an arbitrary amount, hoping to compensate for these risks... This procedure is not to be recommended. A much more logical solution to the problem is to estimate the risks involved.

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"A few brief comments about the calculation of I_d and C_d: 1) The problem can be greatly simplified by considering only differential costs.... 2) The figures should include any risk ex-

pectations and estimates of intangible values (like the advertising value of ownership)... 3) C_d must include receipts as well as expenditures. The salvage value must be added at the end of the machine's life. If the owner plans to rent the machine during times when it is not in use, these earnings must also be included.... 4) The rent, of course, must be based on the expected number of shifts the machine will be in use.... 5) Maintenance costs will not necessarily be proportional to operating time.... 6) Monthly rents must be compounded to arrive at an annual figure.... 7) C_d must be corrected for taxes and depreciation. If the marginal tax rate tax rate is r, the depreciation is D, and C_d before taxes is C_d'; then $C_d = (1-r)C_d' + rD$."

Make cost estimates on every machine possibility

"Theoretically every general purpose computer is a potential machine choice.... The task of the person who chooses a particular computer is one of balancing the cost of the machine against the amount of calculation to be done.... The first step is to make cost estimates on every possible machine choice.... A cursory cost survey should narrow the field considerably.

"The second step is to make the rent-or-buy decision for each machine.... The final step is a series of comparisons between machines.... The initial investments and series of future costs for each pair of machines will result in a differential investment and a differential series of costs.

"A second approach to this comparison between machines should be to find the present worth of the total cost of each machine, I_p plus C_p if the machine should be purchased, I_r plus C_r if the machine should be rented. Then the uniform annual costs of all machines can be compared simultaneously."

OBSOLESCENCE AND EDP

Roger L. Sisson, Canning, Sisson and Associates, Los Angeles
AUTOMATION, September 1958; pages 75-78.

Data processing equipment can become obsolete for any of four reasons: 1) It wears out; 2) It is no longer required; 3) The user company desires to do a much bigger data processing job on the equipment than before; 4) New machines are so much more efficient that it becomes economical to replace the old one. Replies to these statements are as follows: First, EDP systems do wear out, but their life, with good maintenance, is at least 15 years. Second, modern EDP systems are based on internally programed general-purpose computers which can be reprogramed to process new and changed applications. Third, if a company has made only a short-range estimate of its data processing requirements, it should expect its system to become obsolete when management realizes the benefits to be obtained from an integrated data processing system which can be applied to all important functions

Well-planned system should last 10 years

within a company. If a company has planned its system for, say, 10 years, should it be concerned about the fourth reason, technological obsolescence during that period?

The answer, as shown in this article is "no." At present, only by spending more money can one obtain more speed with any given method of processing data. Only a breakthrough to a new information processing component will permit faster speed at the same or lower cost. Therefore the question of technical obsolescence becomes a problem of assessing the probability of such a breakthrough. Through a discussion of the memory requirements of electronic business systems and of research in physical phenomena now being conducted by various electronic organizations, the author concludes that a practical solution to increased memory size and speed will not be available before eight or ten years, and that a computer that has been selected to fulfill the needs of the company for the desired planning period will not become obsolete before that time.

WHY BUSINESS RESEARCH?

Michael J. Kami, IBM Corporation, New York
JOURNAL OF MACHINE ACCOUNTING, August 1958; pages 35-40.

Management Science needs impetus

Research in management sciences is lagging from lack of systems know-how and imperfect command of the language of scientific management. "Unless we set our sights high enough for concentrated and increased effort in business research, paralleling technological research, our business world will fail to utilize the total potential and total power of electronic data-processing equipment." Possible applications of electronic data processing equipment are divided arbitrarily into four categories: 1) volume data processing of single applications; 2) integrated data processing of multiple applications; 3) mechanization of certain decision-making processes on lower management levels; 4) mechanization of certain decision-making alternatives on upper management levels. Categories 1 and 2 have been adopted in varying degrees, but much remains to be done in the integrated approach to gear it toward the physical operations of the company, rather than basing it upon accounting objectives alone. In attempting to reach the level of mechanizing lower management decision-making, a company should: 1) Analyze the areas of lower-level decision-making based on quantitative factors and define these one by one, step by step; 2) determine the criteria on which these decisions are made today and determine when the rules were established and under what conditions; 3) try to relate the effects of each basic individual decision or calculation to the rest of the company's operations. In analyzing the type of decisions at upper management levels, we find that 1) decisions are of a periodic and often non-repetitive nature, and 2) there is often no one best solution to

a problem, but several good alternatives to be selected by the management to make policy decisions.

"When applied to over-all operations of a business in a truly integrated manner, data-processing machines will be able to provide most of the required facts on which policy decisions should be based... management facts will be a by-product of routine paper-work processing."

In summary, "the trend in the application of data-processing machines is and will be from single applications to integration of many functions within a company, absorbing more and more routine decision-making. The rules for these decision-making techniques will also be arrived at through computer analysis. Ultimately, the many facts compiled daily as by-products of integrated operations will permit computer analysis of the overall management picture in policy decisions.

"As we go up the ladder of complexity, we find far more shortcomings and unknowns in the theory and art of business than in the electronic equipment itself. Should progress continue at the present rate, computer technology will vastly surpass business science."

AUTOMATION, 1958: INDUSTRY AT THE CROSSROADS

John Diebold
DUN'S REVIEW, August 1958; pages 36-39, 92-97.

The article presents some key findings of a survey conducted by the author's organization among 280 users of automatic data processing equipment. For example, it was found that 53% of the companies surveyed found their system failed to meet their expectations in improvement in employee morale; 66% met or exceeded their expectations in obtaining new data for long-range decisions. Among all the companies surveyed, 33% of those having large scale computers said their installations fell short of their hopes. Among those having medium scale computers, 44% were disappointed in results. The author believes that "most of the troubles encountered to date can be traced to a serious, and nearly universal, tendency to underestimate the problems of application, complicated by a lack of performance standards for measuring progress." He believes that "automation calls for new management techniques and, therefore, requires detailed, long-range planning of human and material resources."

Don't install EDP to save labor costs

"Probably the most common--and the worst--reason for embarking on an automation program is to save labor costs.... The main trouble with this approach is not that savings usually fail to match expectations. When labor saving is the main goal, it automatically demotes to second place what should be the primary aim of any company installing automation equipment: to exploit fully the potentialities of

these machines for doing things that cannot be done very well, or cannot be done at all, without them." Merely doing faster what has been done in the past will not give the benefits which "accrue only when management learns to use automation for its unique ability to provide more complete, more accurate, and more timely information about the business." Computers, properly used, "can turn the art of management into a real science....the real benefits...are not confined to intangibles like better service; they include material, practical results that are measurable in dollars and cents--the same dollars and cents that are used to pay for the computer. But to obtain these benefits requires imagination and a full realization of what is involved in undertaking such a program. Planning for the automation program....must be done at the top management level...thoroughly enough and early enough to allow for the difficulties and frustrations that are bound to precede the ultimate payoff."

"Shape of things to come"

The second part of the article predicts "the shape of things to come." These are, briefly:

1. Office and plant will be linked.
2. More system output will be graphic.
3. Special purpose data processing systems will be developed.
4. Business will employ data processing equipment for tighter control of operations.
5. "Management by exception" will become a reality.
6. Small shops will use automatic production equipment.
7. More information about operations will be available.
8. Productivity of capital, not labor savings, will be the justification.
9. New demands will be made on management.
10. Organized labor will try to get into the act.

THE MODERN OFFICE—INDUSTRY'S NEW PROFIT FRONTIER

DUN'S REVIEW, September 1958; pages 50-120.

A 6-part feature includes many facets of the problems of office production, from physical layout and personnel to changes in the concept of information processing. A survey of 165 companies, of which 129 were manufacturers, showed that while management was concerned about increasing office costs, very few were thinking of solutions in broad terms for their information processing requirements. A chart is presented which lists types of jobs in sales, manufacturing, general records, and management reporting, and suggests the amount of mechanization which could profitably be used for small, medium, and large volume operations. Management is admonished to stop thinking of the office as a place or a group of people operating machines and handling paper, and begin thinking about the office as a system for integrating the various functions of the total business.

A sample of the figures given for the cost of office operations as a percentage of Sales and the number of non-production workers for every 100 on the line:

In the food industry, for firms with a sales volume of $25-50 million, 2% of Sales goes for office operation, and for every 100 production workers, there are 65 non-production workers. In the electrical machinery industry for like sales volume, 8% of sales goes for office operation, and 78 non-production workers are needed for every 100 on the line.

THE AUDITOR AND THE COMPUTER

J. W. Margetts
THE ACCOUNTANT, September 6, 1958; pages 276-283.

Some suggestions for auditing procedures in an electronic accounting system are given. Two key points at which the auditor must be brought into the planning for the system are 1) when the full details of the proposed accounting application have been agreed, and the detailed instructions for programing are under way; and 2) during programing when the programer may recommend variations to the procedure originally agreed. The auditor should know something of the EDP principles involved in the application, and he should be able to read and verify the accuracy of the computer program.

Procedures for internal control

Internal control in an EDP system should provide for:

1. A period of running the computer program along with the existing method, so that program errors can be found.

2. Deliberate errors introduced into the system to see that program checks function properly.

3. Program kept under control of the chief accountant.

4. All financial records and the physical location of the accounting staff kept separate from programers.

5. Detailed record kept of computer operation and down-time, and reasons for latter, and of the movements of the programs and stored computer information.

6. Outside control totals kept by chief accountant to check computer totals.

7. Input media independently verified before entered into computer.

8. Program checks and print-out of figures resulting in control totals.

9. Safeguards against unauthorized interference with the computer while in operation.

In auditing a computer application, the auditor should do the following:

1. Check the above points for adequate coverage.

2. Inspect computer time records.

3. Examine program changes during inter-audit period.

4. Test check the control or total accounts kept outside the computer.

5. If necessary, have the computer supervisor process information for which the auditor has already manually obtained answers.

6. Require certain sections of the computer information be printed out in full for test checks with original documents.

7. Manually process certain portions of current information.

IMPLICATIONS OF ELECTRONIC DATA PROCESSING FOR BUSINESS EDUCATION IN HIGH SCHOOL

Enoch J. Haga, Sacramento State College, California
COMPUTERS AND AUTOMATION, September, 1958; pages 24-26.

Since many of the lower level jobs in EDP installations will be available to high school graduates, it behooves high school business educators to become aware of the training needs for these jobs and adjust their curricula accordingly. It appears that the traditional business education curriculum may be inadequate, in that less training will be required in such subjects as shorthand, and more training will be needed in the fundamentals of general education, such as logic and mathematics. One of the needs schools will face is the opportunity for both faculty and students to become acquainted with EDP equipment. Since such equipment is too expensive for the average school system to acquire, cooperative plans must be worked out. Further research must be done in compiling information sources, such as bibliographies and audio-visual aids; curriculum study; definition of the responsibility of high schools in the EDP training field; opportunities for cooperative work experience programs; and provision of EDP equipment for high school faculty and student practice.

((See: "Education for EDP," DPD, June 1958; pages 13, 14.))

SMALL BANK AUTOMATION

Neil J. Dean, Booz, Allen & Hamilton, Los Angeles
AUDITGRAM, September 1958; pages 4-11.

Small banks may be forced into automation

Automation in larger banks will inevitably have an affect upon smaller banks, whether or not they consider themselves able to install automatic systems. For example, the Federal Reserve System will make use of the most advance equipment for sorting and listing checks. This will require that all checks carry the ABA number and routing symbol in magnetic ink characters in a specified location. Moreover, proof after sorting, and dollar controls for individual bank clearings for Federal Reserve ledger entries will also be done automatically. This would require that the dollar amount also be encoded in magnetic ink on all checks. This latter amount should be qualified on the check by the bank first handling the item. Thus, small banks would be pressured to cooperate with equipment or facilities. Even more serious would be the competitive advantage of automatic methods.

How small is a small bank for purposes of mechanization depends upon the number and type of deposit accounts it has, what the bank's policy is toward cycling statements, and what its inquiry policy and customer service procedures might be. Other operations that should be considered include instalment loan accounting, trust bookkeeping, payroll, and general ledger accounting. Using a $100 million bank as an example, if it had 25,000 accounts with 30,000 or 35,000 transactions a day, a modest electronic system would be economically attractive.

If, on the other hand, the bank had fewer than 10,000 accounts, then the justification of electronics would be seriously questioned.

WHY THE RIFT IN EDP DEVELOPMENT?

WHERE ADPS FITS IN THE ARMY FUTURE

ARMED FORCES MANAGEMENT, September 1958; pages 5-10.

The editor sees the electronic computer industry as wearing blinders which keep it from seeing the real needs of the government in EDP equipment. "The Services....are seemingly a good deal more imaginative about the possibilities of EDPS than are the machine manufacturers. The Army and Air Force....have definite 'learning and training' programs with completion target dates in the 1960's. One of the primary results of their programs will be a description of machine characteristics needed to do the integrated job of the services in research, logistics, personnel and combat." The requirements are expected to "have little resemblance to existing equipment."

"The net result could well be a revolution in the EDPM industry by 1965 in which the services will ignore industry entirely, draw up a list of their needs, and throw the job open to bids."

Principal characteristics of the desired "integrated, general purpose, computer-communication system" would be: Computer centrals completely integrated with communications, capable of usage in combat zones, designed on the building block principle to provide varying capacity according to requirements. The central computing systems would consist of a minimum number of plug-in components easily replaceable. The center should be compatible with military and commercial communication systems, with input and output data in machine format, suitable for encryption.

PROCEEDINGS, PETROLEUM AND NATURAL GAS INDUSTRY AND COMPUTERS

Seminar, August, 1958, sponsored by Oklahoma City Chapter, N.A.A.

A seminar on the application of electronic computers in the petroleum and natural gas industry was presented in the form of a top management meeting of a simulated company. The participants in the seminar assumed the roles of the company officers who gave reports on how computers could be used in their respective areas of responsibility. These included the underground reservoir and recovery problems, refinery processes, efficient product movement, forecasting product demand, and accounting procedures.

Some of the problems to be encountered in entering an EDP program were also mentioned. The presentation is easy to read, and is copiously illustrated with reproductions of charts shown in the original meeting. For information on obtaining a copy of the proceedings, write: Lewis C. Maull, Peat, Marwick, Mitchell & Co., Republic National Bank Building, Dallas 1, Texas.

COPYRIGHT IN PROGRAM MATERIAL FOR COMPUTING MACHINES

THE COMPUTER BULLETIN, August-September 1958; page 23.

The British Computer Society expresses the opinion, through the pages of its Bulletin, that the copyright laws apply to computer programs written, or published, in that they are literary works. The copyright would extend to punched card or tape copies of the program or to copy in any material form from a mechanically recorded program. Another programer, working on the same problem and producing a program in the same or substantially same form, however, would not be guilty of infringement if he did not have access to the original program.

Management Decision-making Techniques

OPERATIONS RESEARCH IN ACTION

Herbert J. H. Roy, General Petroleum Corporation
HARVARD BUSINESS REVIEW, September-October 1958; pages 120-128.

"Despite its effectiveness... OR presents many pitfalls which can destroy its usefulness to a company inexperienced in its application." General Petroleum Corporation has developed a check-list of questions and steps toward a successful OR approach. In brief outline, these are:

Check-list for a successful OR approach

I. Selecting the Problems. In deciding whether or not a problem lends itself to OR treatment, it is necessary to have: data which can be studied and measured quantitatively; the opportunity to decide between different courses of action; ways to evaluate results readily. In addition, answers to these questions will be helpful: Are the problems big ones? Are the problems complex? Are the problems current and pressing? Would OR methods be less expensive and more accurate than the present methods of finding answers? Initial identification and defining of the problem should be done by people within the company. Later, a consultant may be called upon for assistance.

II. Interesting the People. "...the closer the operating group can be tied into the consideration of a new method from the very beginning, the better the payoff in terms of cooperation, interest, and enthusiasm."

III. Using the Consultants. Shop carefully for a consultant, and then keep him on a retainer. "...select people with whom you will be compatible and with whom you are willing to share confidences." Select the consultant with these criteria in mind: The consultant firm should be interested in applied science, if the OR approach is to be practical rather than basic research. The consultant should have experience with the particular type of problem, or at least some transferable experience. The consultants should communicate well with the clients, have an attitude which will win people's cooperation, recognize the need for being patient with non-technical people, and have philosophies of business which are not directly antithetical to the client's.

What to tell management

IV. Proposal to Management. Management will be asking questions about OR which may include: How well tested are the proposed methods? Is the cost justified by the estimated

savings? Is it current and pressing? How will making this study affect our operating people? An oral presentation should be carefully prepared, in which the persons suggesting the OR approach consider whether management is prepared to act on recommendations resulting from an OR study, is ready to endorse the project wholeheartedly, and will be frank and cooperative in self-examination. In addition, the presentation should include alternative problems as possible subjects for OR study, the recommendation as to which one should be selected, the next steps to take, opinions as to what would happen if neither study were made, and a summary. A supplementary written proposal would include a detailed discussion of each of the problems, and details concerning the qualifications of the recommended consultants, along with their preliminary proposal.

The company OR team

V. Company Task Force. Company people should be included on the OR task force "to establish and maintain good contacts between OR consultants and the persons involved in the study.... reduce the cost of gathering and analyzing information." Also, they can learn from the OR consultants and provide an "in-company" OR group, and help the consultants by answering questions on policy, procedure, etc. The men in the activity being studied should participate in the project from the beginning. Before the study is begun, management should set up certain "ground rules" which should include: selection of a good leader, breaking the problem down into segments, keeping records of instructions given by the force to operating people, agreement on "cutoff" points.

VI. Understanding One Another. Management and OR consultants should make a determined effort to understand each other. A man at the managerial level could act as liaison between management and the OR group. Periodic progress reports should be made to management.

VII. Need for Patience. Unforeseen circumstances, and slowness of changes in people's attitudes are instances which require patience on the part of the OR people.

THE FACTS ABOUT OPERATIONS RESEARCH

F. Reese Brown, Brown, Woodbury, Nemerever & Henry, Inc., New York
MANAGEMENT METHODS, September 1958; pages 39-41, 77-79.

In a question and answer article, some suggestions are given on evaluating operations research for use in solving some business problems. To tell whether operations research will contribute toward the solution of a specific problem, look for the following characteristics: the problem should involve a recurring decision; it should be capable of being formalized in terms of one of these verbs: allocate,

How to tell if you can use OR

assign, hire, buy, sell, route, schedule, dispatch, maximize, minimize, optimize; it should usually involve profits, time, or costs. While only the larger company can afford to maintain an OR staff, smaller companies may be aided by consultants who have qualified OR personnel.

The steps involved in an OR solution include: 1) formulating the problem, 2) constructing the mathematical model, 3) deriving the solution from the model, 4) testing the model, 5) developing controls over the solution, 6) applying the solution. The actual cost of a solution by OR methods should be measured only in terms of the money it can reasonably be expected to save. While OR does not replace executive judgment, it will replace routine judgment in many areas. Some obstacles to successful application of OR techniques are listed:

1. Insufficient data.
2. Required data is not obtainable.
3. Cost of obtaining the data is prohibitive.
4. Data is inaccurate and cannot be corrected.
5. Impossible to determine the relationship of the controllable and uncontrollable variables.
6. Problem cannot be formulated in numbers of quantities.
7. Data cannot be put into a form adaptable to the appropriate OR technique.

CORRECTION

The correct title of the digest at the top of page 7 in the October 1958 issue of DATA PROCESSING DIGEST is: "Proceedings, Executive Conference on Organizing and Managing Information." The Proceedings are published by University College, University of Chicago.

Applications

ELECTRONIC BRAIN MANAGES SPERRY INVENTORY

Charles G. Schaefer, Sperry Gyroscope Company
AERONAUTICAL PURCHASING, September 1958; pages 19-21.

Computer system controls low value parts inventory

Sperry uses a Univac for its ACE Inventory System, in which it manages an inventory of 8000 parts of the low value, high usage type. This is in contrast to most inventory control systems which automate the control of high dollar value items. The decision seemed logical, however, because, considering the minor contribution of the low value inventory to total inventory cost, it required a disproportionate share of control time.

A theoretical system was set up first, based on the use of the Economic Order Quantity formula. It was found that the system showed a potential inventory cost investment reduction of 50 percent. Also, the system indicated it would give more than adequate protection against stockouts, and it would do the job economically, requiring one clerk and seven hours of computer time per month, against five clerks in the manual system. Net reduction in operating costs came to nearly $100,000 a year. When the real system went into effect, it was found to function very much as predicted.

The system has two main files on magnetic tape--the Master Parts File and the Control File. Inventory data is processed weekly, with certain modifications introduced into end-of-month processing. Output consists of purchase requisitions, standard parts and hardware catalog, on-order status report, continuous inventory verification report, monthly accounting journal vouchers, delinquent purchase order report and one-shot reports as required.

MONTGOMERY WARD'S AUTOMATED DISTRIBUTION CENTER IN DETROIT

STORES, September 1958; pages 55-57.

The Allen Park warehouse in Michigan is the first of a network of 12 distribution centers for Ward's stores. An IBM 304 RAMAC processes orders and maintains inventory records. The RAMAC processes the store requisitions, and for each article produces a punched card which is the order-filling document for the warehouse and the shipping tag. It contains all the instructions for shipment. As each order is processed, RAMAC updates the inventory file. It produces a typewritten inventory report on each item every two weeks, showing withdrawals by stores, receipts, on hand and on order information, plus an inventory turn figure calculated on an annual basis. In addition, the RAMAC auto-

matically flashes a "merchandise action notice" when stock reaches a critical level. The center's merchandise manager expects an average 8.5 turnover of stock compared with an average of 3.0 turnover in the Detroit area in the past. The increase is the result of the system's guaranteeing adequate stocks and automatic replenishment, freeing store managers for concentrated effort on selling.

HIGH-POWERED UTILITY BILLING

DATA FROM ELECTRODATA, August 1958, pages 4, 5.

Pacific Power & Light Company in Portland, Oregon, serving over 200,000 customers, uses a Burroughs ElectroData 205 to process 30,000 items a day. During a single pass it bills customers and updates account records, making all necessary changes on the magnetic tape files. When a meter is installed the service department sends the required information to the Customers' Office. An order card is then forwarded to the Computing Center for processing. The card contains the number of days on which the opening bill should be prorated and the initial meter reading. When the meter is next read, the computer has all the information it needs to prepare the bill.

Mark-sense meter cards

Field office records consist of a mark-sense meter reading card and prepunched cards to effect changes which may occur in the account. When the bill is returned to the field office for mailing to the customer, it is accompanied by a billing register which is used for customer look-up. Subsequent payments are processed each day and daily cash lists returned to the field office.

All accounts are processed on the computer twice a month--once at billing time and again two weeks later when the accounts are past due. During this run, the computer prepares a list of past due accounts and, again in one pass, all changes and adjustments are posted. As a by-product of the billing run, the computer system produces statistics on revenues by class of customer, by area, and by rate schedule in addition to other data required by regulatory bodies. The company plans to use the 205 to solve complex engineering problems concerned with the generation, transmission and distribution of power.

Comment

THE SIGNIFICANCE OF EQUIPMENT IMPROVEMENTS

The announcement of the new IBM 7070[1] and the two articles in this issue on "rent or buy"[2, 3] raise the question of technological obsolescence and the significance of equipment improvements. It might be well to look back over the past four years, to see what has actually taken place. Then, with this information, we may be able to draw some better conclusions about the future.

The Past Four Years

For the sake of discussion, let us define two types of medium-large scale EDP systems: "old" systems which were ordered in late 1954 for delivery in early 1956, and "new" systems which are being ordered in late 1958 for delivery in early 1960. There is some logic in these definitions; machines such as the IBM 705 Model I and the Bizmac I might fall into the first category, while such machines as the IBM 7070, the NCR 304, the Burroughs 220, and the RCA 501 might fall into the second.

Comparing the "old" and the "new" machines, we come in general, to the following conclusions:

1. The purchase price of the "new" systems is from 50% to 75% of the purchase price of the "old" systems.

2. The overall operating speed of the "new" systems is from 30% to 40% faster than even up-dated versions of the "old" systems.

3. Maintenance costs on the "new" systems have in some cases been cut drastically below the "old" systems; the IBM 7070 is a good example of this.

Point 2 is significant. Some of the "old" systems have been improved since their initial release by a model improvement and/or by the addition of supplemental buffer units. Even with these improvements, "new" machines often show sizeable increases in overall operating speeds, in comparative studies.

Considering all three points, we must conclude that the "new" systems produce work more economically, and with less outlay of cash, than the "old" systems. Within the past four year span, economic improvements in the "old" machines (through up-dating) was accomplished only by spending more money, for additional equipment. Apparently there has been a four year "cycle" for making a significant improvement in equipment.

The Years Ahead

One "cycle" of equipment improvement probably is not sufficient for drawing accurate generalizations. Since it is the best information we have, however, we are entitled to use it, with proper qualifications.

An organization which is ordering a medium-large EDP system today might use the following guide lines:

1. Within two years, a model improvement or additional updating equipment will be offered by which you can increase the efficiency of your system, but at added cost. In general, the cost of this improvement should be less than your gain from using the improvement; otherwise you would not consider using it.

2. Within four years, another "cycle" of machines will be released which are significantly better than "present" machines. Perhaps the major effect of these machines would be to considerably depress the price of a "present" computer which was being sold on the open market as a used computer. It is not yet clear what percentage of "present" machines on rental would be returned in favor of the "new" machines. Also, it is not yet clear how many purchased machines would be disposed of, in favor of the "new" machines.

3. Within 8 to 10 years, at least two "cycles" of equipment improvement should have occurred, and it is very possible that "present" equipment would be no longer economical. That is, it would pay to dispose of the "present" machine and install the much more economical "new" one. This conclusion is supported by surveys of engineering developments in this field. [3]

4. When an organization purchases an EDP system, it would be well to assume that the open market value of the system falls to 20% to 45% of original price. Also, a depreciation period of 5 to 8 years might be most realistic, for accounting purposes.

The EDP field is still too new to know how accurate these generalizations are. Until better evidence is available, however, they should prove useful.

REFERENCES

1. IBM 7070--DPD, October, 1958
2. "Computing Machines: Rent or Buy?"--DPD, November, 1958
3. "Obsolescence and EDP,"--DPD, November, 1958

Other articles on related questions:

4. "Office Equipment: Buy or Rent?"--DPD, August, 1957
5. "New Equipment,"--DPD, November, 1957
6. "The Meaning of New Equipment Announcements,"--DPD, March, 1958

Meetings

Fifth Institute on Electronics in Management--"Current Developments in Automatic Data Processing Systems"

Date: November 3-7, 1958
Place: American University, Washington, D. C.
Information: Lowell H. Hattery, Director, Institute on Electronics in Management, American University, 1901 F Street N. W., Washington 6, D. C.

International Conference on Scientific Information

Date: November 16-21, 1958
Place: Washington, D. C. (Mayflower Hotel)
Information: Secretariate, International Conference on Scientific Information, National Academy of Sciences, 2101 Constitution Avenue, N. W., Washington 25, D. C.

Equipment Systems Conference, sponsored by Department of Navy, Eleventh Naval District, with the cooperation of local chapters of SPA, NMMA, NOMA, AIIE, and San Diego State College and the City and County of San Diego.

Date: November 19-21, 1958
Place: San Diego, California (Balboa Park Conference Building)
Information: Chairman, Equipment Systems Conference, c/o District Management Assistance Office, Hq. Eleventh Naval District, San Diego 30, California

National Physical Laboratory Symposium and Electronic Computer Exhibition

Date: November 28 - December 4, 1958
Place: London, England
Information: C. V. Wattenbach, Deputy Managing Director, Dictograph Telephones, Ltd., London, England

Eastern Joint Computer Conference

Date: December 3-5, 1958
Place: Philadelphia, Pennsylvania (Bellevue Stratford Hotel)
Information: Mr. P. Raffa, Technitrol Engineering Co., 1952 E. Allegheny Ave., Philadelphia 24, Pa.

Western Joint Computer Conference
Date: March 3-5, 1959
Place: San Francisco, California (Fairmont Hotel)
Theme: "New Horizons with Computer Technology"
Information: WJCC, Box 381, Station A, Palo Alto, California

International Conference on Information Processing
Date: June 15-20, 1959
Place: Paris, France
Information: U.S. Committee for the First International Conference on Information Processing, Box 4999, Washington 8, D. C.

1959 ACM National Conference
Date: Summer, 1959
Place: M.I.T.
Information: F. Verzuh, Massachusetts Institute of Technology, Cambridge, Mass.

SHARED PROGRAMING GROUP

ALWAC Users Association - November 12, 14, 1958, at the ALWAC Plant in Hawthorne, California
USE--December 10-12, 1958, at El Paso, Texas
April 1-3, 1959, at Chicago, Illinois

Training

Engineering and Management Course
Date: January 26 - February 5, 1959
Place: University of California at Los Angeles
Information: R. R. Cole, College of Engineering, Room 3104 University of California, Los Angeles 24, California

COLLEGE COURSES

Cornell University, College of Engineering, and School of Bus. Adm.
ME 3281, Computing Equipment Applications
BPA 234, Administrative Applications of High Speed Computers.

Related work is offered in the Mathematics Department and the School of Electrical Engineering. For information, write to: Professor Richard Conway, Department of Industrial and Engineering Administration, Cornell University, Ithaca, N. Y.

References

The publishers of books and periodicals mentioned in this issue of DATA PROCESSING DIGEST are listed below for your convenience in writing for more complete information.

The Accountant
4 Drapers' Gardens
Throgmorton Avenue
London EC 2, England

Aeronautical Purchasing
812 Huron Road
Cleveland 15, Ohio

Armed Forces Management
1001 Vermont Ave., N. W.
Washington 5, D.C.

Auditgram
38 South Dearborn Street
Chicago 3, Illinois

Automation
Penton Building
Cleveland 13, Ohio

The Computer Bulletin
The British Computer Society Ltd.
Finsbury Court, Finsbury Pavement
London EC 2, England

Computers and Automation
815 Washington Street
Newtonville 60, Massachusetts

Dun's Review & Modern Industry
99 Church Street
New York 8, New York

Harvard Business Review
Soldiers Field Station
Boston 63, Massachusetts

Journal of Industrial Engineering
145 North High Street
Columbus 15, Ohio

Journal of Machine Accounting
208 South Main Street
Paris, Illinois

Management Methods
22 West Putnam Avenue
Greenwich, Connecticut

Stores
100 West 31st Street
New York 1, New York

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